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THE SOUTHWESTERN DESERTS TOUR

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The annual spring tour of the Arboretum School took place between May 16 and 29, 1975, and had as its principal objective a visit to the Mojave and Sonoran deserts of southern California, Nevada and Arizona.

Before participating in this tour my wife and I attended the biennial convention of the Cactus and Succulent Society of America which was held in San Diego, California, from May 11 to 16.

Since the field trips and scientific content of the convention program were so closely allied to the objectives of our tour it is deemed appropriate to present here a brief account of the proceedings.

On Sunday evening, May 11, and on the mornings, afternoons and evenings of the following Monday, Wednesday and Friday there was offered a well-balanced program of topics devoted to cacti and succulents from many parts of the world. There were detailed discussions by distinguished students of such critical genera as *Agave, Ferocactus* and *Mammillaria*. Dr. Reid Moran, of the San Diego Museum of Natural History, gave a superbly illustrated talk on the Crassulaceae; Dr. Philip E. Downs, of South Africa, described his visit to photograph *Welwitschia* in Angola and Dr. E. F. Anderson, of Whitman College, gave a fascinating account of the "Cacti of the Galápagos Islands" (where our tour had been in January of this year). Dr. Lyman Benson, Professor Emeritus of Pomona College and Dean of American Cactophiles, offered much new material in a scholarly lecture on the ill-fated development of Luther Burbank's "spineless cacti".

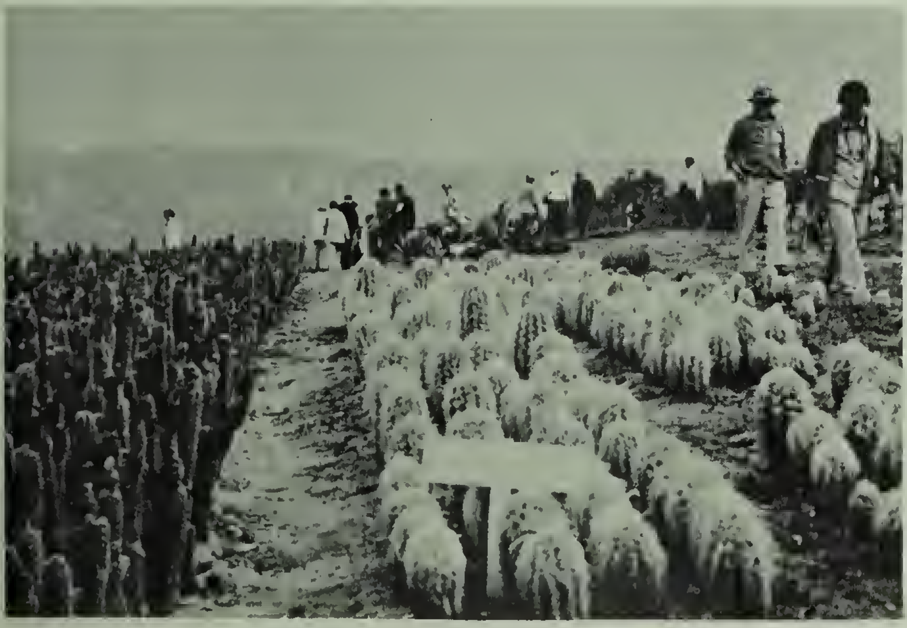

Fig. 1. Western Cactus Growers Nursery.

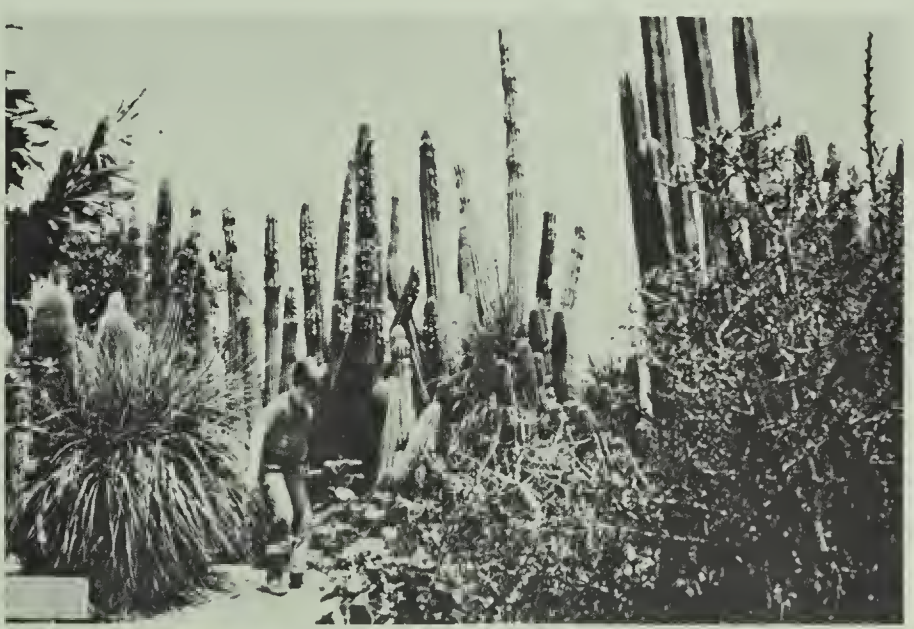

Fig. 2. *Cephalocereus* in Grigsby Cactus Garden.

Tuesday, May 13, was devoted to visiting three cactus nurseries and two remarkable gardens. If anyone doubts that the growing of cacti and other succulents is "big business", he would do well to spend a little time in this and other centers of cultivation where these plants are produced not by the thousands, but by the millions. The Western Cactus Growers, which we visited first, is one of these (Fig. 1), and the Indian Rock Nurseries, which we saw later, is recognized as the largest such installation in the country, producing some 4,000,000 units per year within its twenty-five acres.

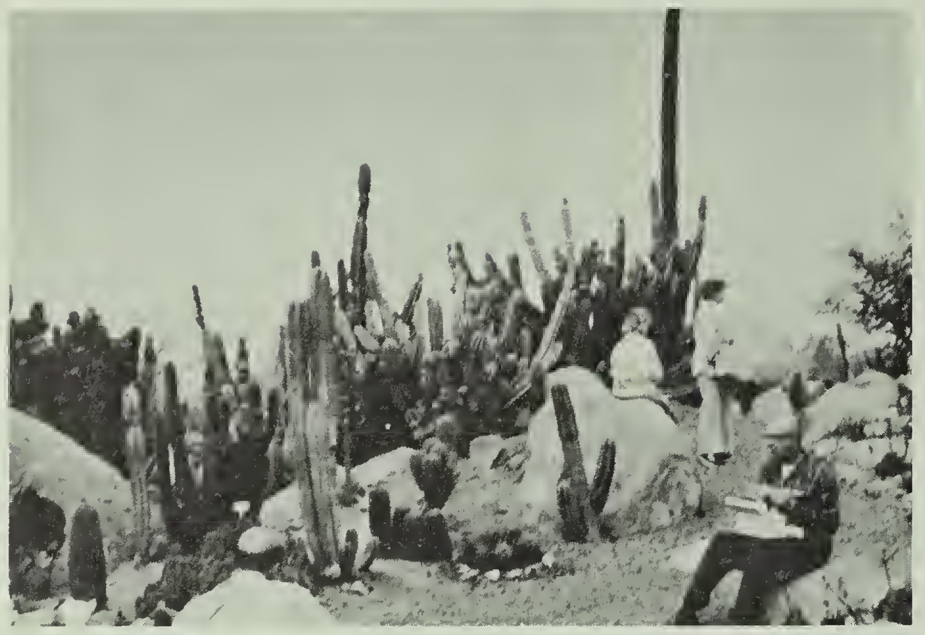

Fig. 3. View in Palomar Garden.

The most attractive nursery we saw was the Grigsby Cactus Garden at Vista. There was the usual seemingly endless row upon row of plastic-covered enclosures housing countless rare and unusual plants. But the real charm of the place lay in its outdoor setting, where thousands of plants were displayed on a series of descending terraces. At one level was a large group of golden-barrels (*Echinocactus Grusonii*) in full flower. Further down a tall hedge of *Cephalocereus* (Fig. 2) from tropical America vied for honors with enormous specimens of *Aloe Bainesii* from South Africa. Although neither a cactus nor a succulent, the luscious pink flowers of *Chorisia speciosa*, of the Bombacaceae, were bidding for attention.

The first of the two gardens mentioned earlier was that of the Palomar Cactus and Succulent Society, established and maintained by them on the campus of Palomar Junior College. At first sight this garden conveys the impression of having originally been a vast pile of granitic boulders dumped promiscuously upon an unsuspecting hillslope. Thanks to the construction of interlocking walks and a great deal of imaginative planting, the members of the Society have succeeded in converting this rockpile into a very exciting garden. In addition to many native cacti and succulents, there is a wealth of diversified material from many parts of the world. (Fig. 3).

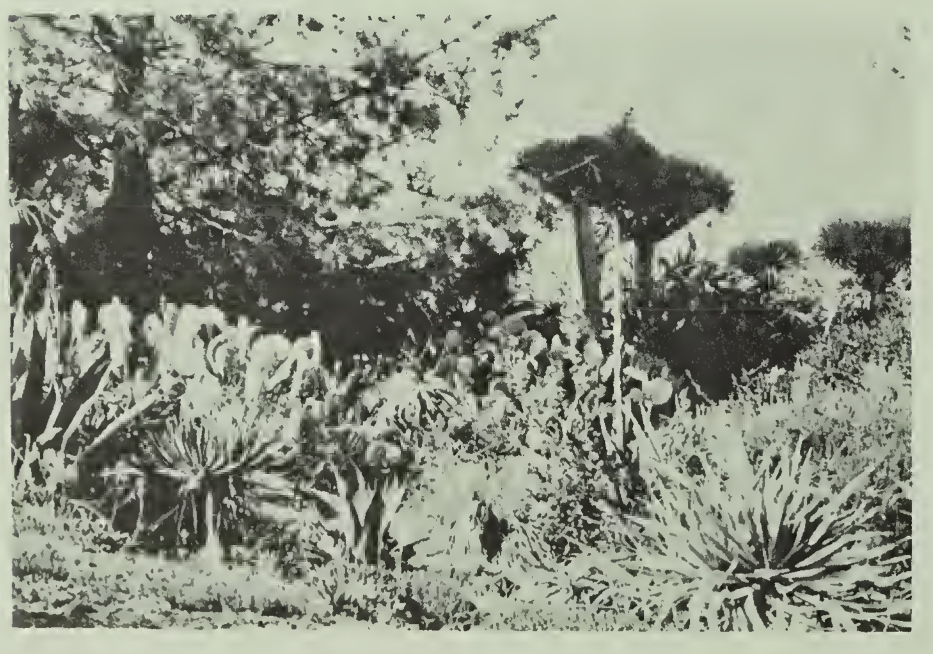

Fig. 4. View in Quail Botanic Garden.

Our last stop of the day was at the Quail Botanic Garden in Encinitas. This garden owes its existence to the generosity of Ruth Larabee who, in 1957, donated 26 acres to the county "for park purposes". Today, because of its soils and topography, these gardens possess microclimatic factors favorable to supporting a wide variety of plant communities. A few of the more interesting species were *Podocarpus enciculos* from Africa, *Podachaenium eminens* (a 40-foot tall composite from Mexico) and several fine specimens of the dragon tree *Dracaena Draco* from the Canary Islands. (Fig. 4).

For those who conceive of deserts as endless flat or undulating wastes of nothing but sand a tour of our southwestern deserts must come as something of a revelation. It seems probable that our childhood concept of a desert may have been derived from descriptions of the Sahara, which is a very special formation resulting largely from water-deposited and wind-blown sands.

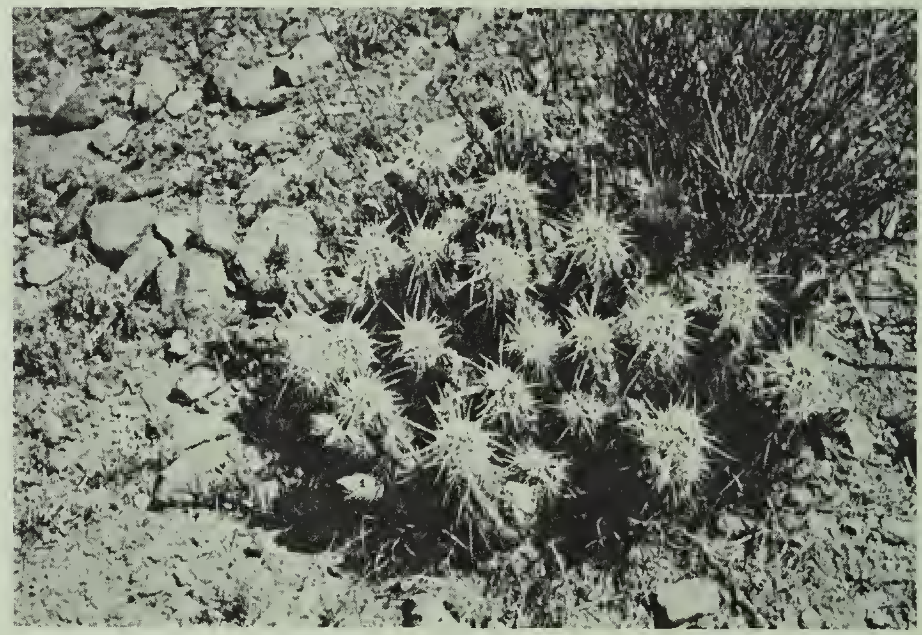

Fig. 5. *Echinocereus Engelmannii* at Jacumba.

If our southwestern deserts have a single feature in common (other than those of sparse and infrequent rainfall) it is their ruggedness. Open sandy stretches may occasionally occur, but for the most part these deserts are characterized by bold relief: dramatic differences in elevation from snow-capped mountain ridges to alkali sinks far below sea-level, precipitous cliffs and deeply etched canyons, gargantuan masses of angular or rounded boulders, arroyos and washes etched by flash floods of unbelievable violence and volcanic outcrops of lava, basalt and other extrusive materials. Several of these habitats are shown in the illustrations included in this account.

For the lover and grower of cacti and other succulents who may always have visualized them as plants of open sandy areas, this tour again served as something of an eye-opener. Many of his favorite plants were found with their roots firmly entwined about the coarse pebbles of a landslide or wash, others clung tenaciously to tiny crevices in sheer, almost inaccessibile, cliff-faces and still others grew only under the protective shadow of other and larger plants.

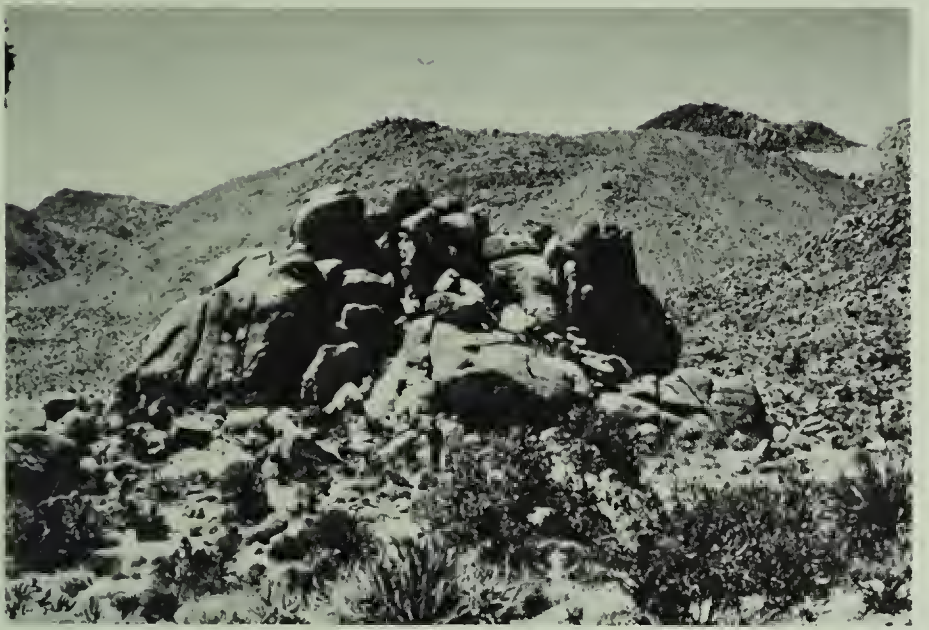

Fig. 6. Boulders at Mountain Springs Grade.

Our schedule for Thursday, May 15, featured an all-day visit to the Anza-Borrego Desert State Park. Proceeding eastward from San Diego, our cavalcade of charter busses passed through an extensive area of chaparral, an evergreen shrubby formation, of which one of the dominant components is the genus *Arctostaphylos*, known commonly as manzanita. Unlike our eastern *A. uva-ursi*, or bearberry, which is a prostrate ground-cover, the western species are usually upright shrubs with small reddish fruits resembling miniature apples, hence the common name.

We next traversed a vast region illuminated by ''desert candles''. These are *Yucca Whipplei*, a smallish species with basal leaves from which arise upright racemes of pure white flowers.

Our first stop was at the Jacumba train depot. Here, on a steep rocky slope, were deployed such interesting cacti as *Opuntia phaeacantha* var. *discata* and *Echinocereus Engelmannii*, the latter resplendent with brilliant scarlet flowers. (Fig. 5). Partially concealed under the foliage of other plants were occasional rosettes of *Dudleya arizonica*, not a cactus but a handsome genus of the Crassulaceae with some sixty species in western North America. Here, also, were frequent plants of *Juniperus californica*, the most copiously ''fruited'' juniper we had ever seen.

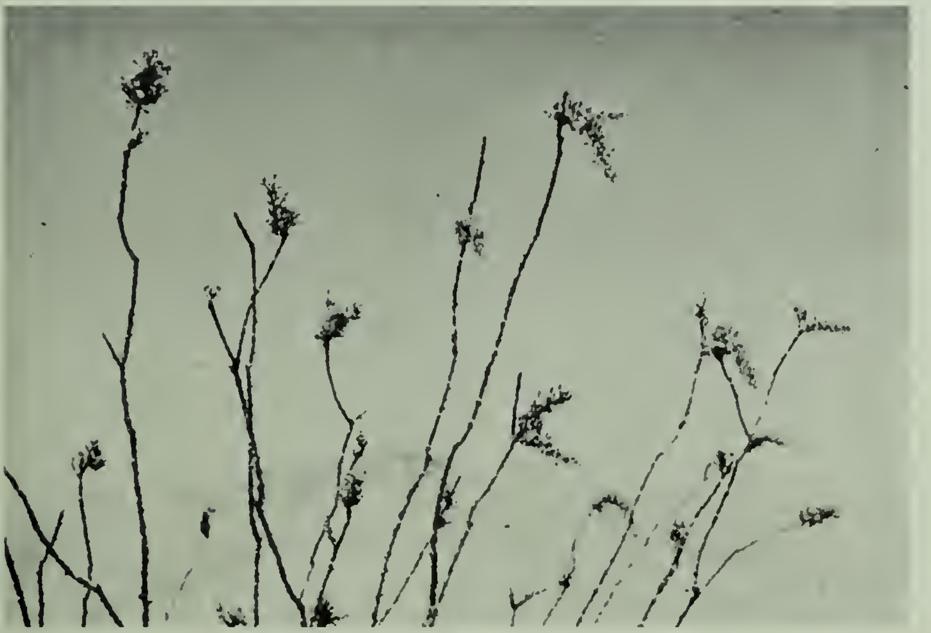

Fig. 7. *Fouquieria splendens.*

From Jacumba our caravan descended almost to the Mexican border where we spent an active hour scrambling over and around the fantastic rock formations of Mountain Springs Grade. (Fig. 6). Among the cacti at this locality were the hedge-hog (*Opuntia echinocarpa* var. *Wolfii*), the beaver-tail (*O. basilaris*) and the melon cactus (*Ferocactus acanthodes*), here more of a barrel than a melon. We had been seeing non-flowering plants of ocotillo (*Fouquieria splendens*) all along the way, but now for the first time we beheld it in full bloom, its bright red flowers producing an unforgettable sight against an azure sky. (Fig. 7).

It was here, too, that we first saw *Simmondsia californica* (*chinensis*), the deer-nut or jojoba (pronounced ho-hó-ba). This evergreen shrub, which belongs to the Buxaceae or boxwood family, has during recent years been the subject of intensive study by chemists who have discovered that the seeds contain an oil which is a liquid wax and may be used as a substitute for sperm oil in many lubrication applications. We were to encounter it frequently throughout ensuing days.

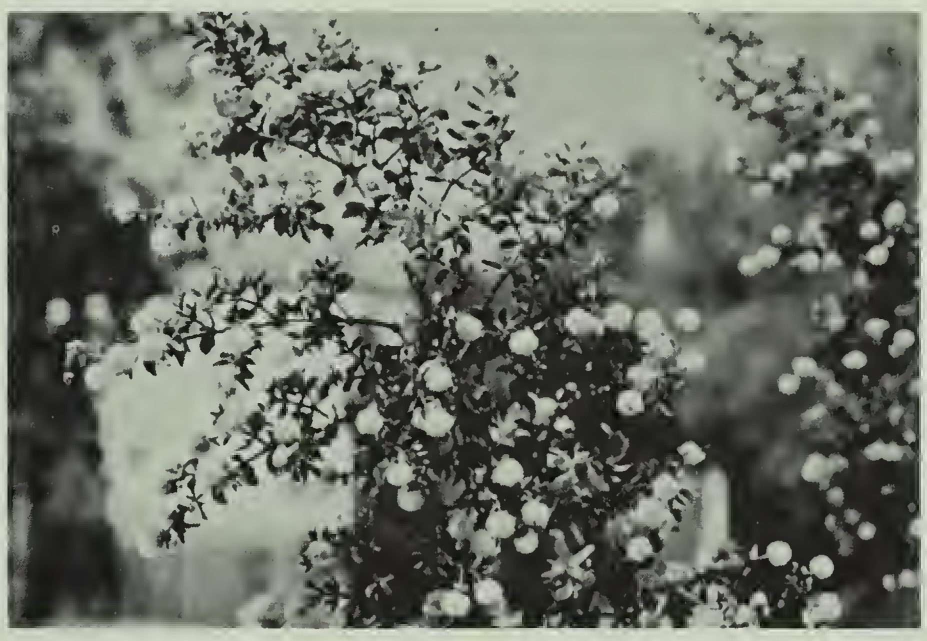

Fig. 8. *Larrea divaricata* in fruit.

Among other specialties at this locality were *Yucca valida, Agave deserti, Nolina Bigelovii* and *Prunus fasciculata*, the last-named a tough, much-branched desert almond.

We then drove through desert country, where the red flowers of the ocotillo and the bluish-violet blooms of the smoke tree (*Parosela spinosa*) formed a pleasing combination, and stopped to eat our box lunches at Vallecito, which over a century ago had been an important stage station between St. Louis and San Francisco.

Our last desert stop of the day was a very brief one, merely to look down into the rocky chasm of Box Canyon, but we spent some time in the basement of the Town Hall in Julian, inspecting a display of wild flowers. We were informed that every year at this time members of a local society scour the country-side within a fifteen mile radius and collect specimens of every plant in flower. The result was a colorful and highly instructive exhibition of several hundred labeled flowers, some of which we had seen in the field, but had been unable to identify.

On the afternoon of Friday, May 16, some thirty members of our Arboretum Tour joined us at our hotel in

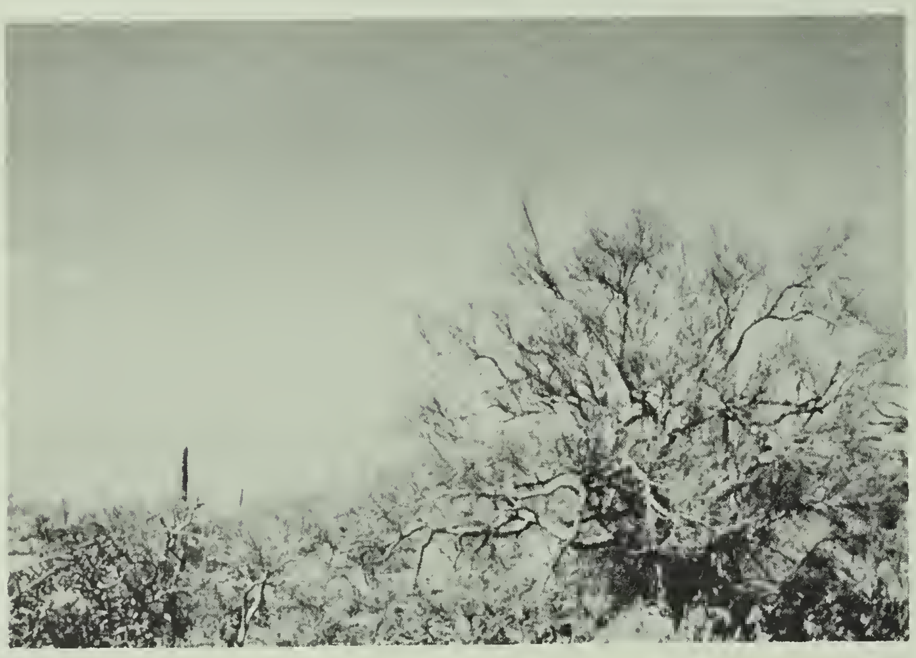

Fig. 9. *Cercidium floridum* in its dormant state.

San Diego and the following morning we embarked upon the itinerary which was to occupy us for the following two weeks.

First on our agenda that Saturday morning was a visit to the world-renowned San Diego Zoo in Balboa Park. So much has been written about this zoo and the naturalistic display of its animal inhabitants that mention is made here only of the fact that it is at the same time a veritable botanist's paradise. On all sides, as one walks or is driven around its many miles of paths and roadways, he is surrounded by a lush vegetation of tropical and subtropical plants. Among the more noteworthy species there is space to single out only the following few:

Solandra guttata. A climbing member of the Solanaceae with enormous tubular yellow flowers, justifying its common name, chalice-vine.

Cheiranthodendron pentadactylon. The rare and bizarre hand-flower tree of Mexico. Some members of the tour recalled having seen this species in Albert Park in Auckland, New Zealand.

Strelitzia Nicolai. Unlike the common bird-of-paradise flower, which is a small plant with yellow and purple flowers, this species is a tree with flowers which are blue and white.

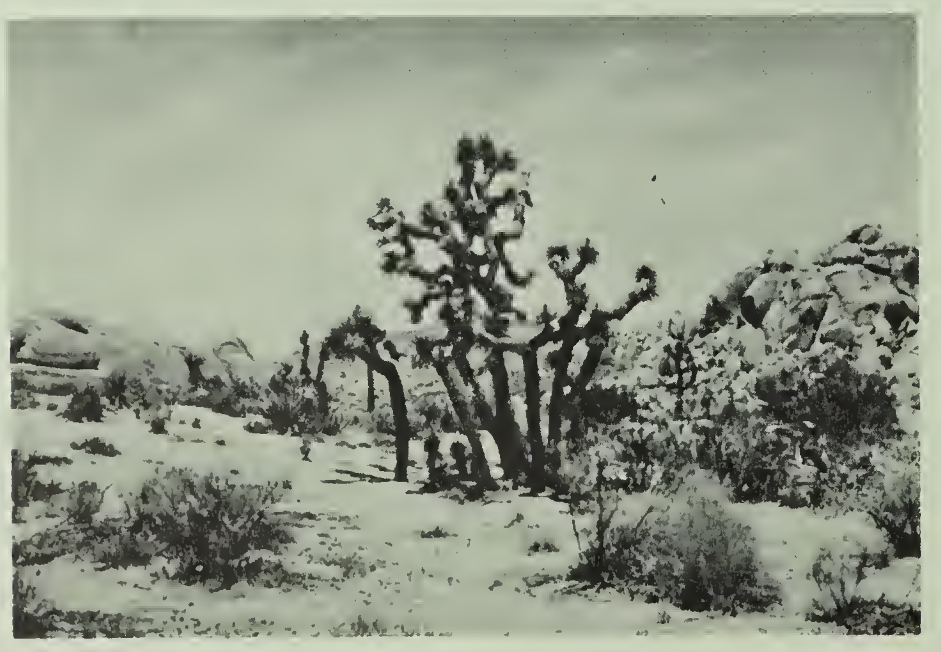

Fig. 10. *Yucca brevifolia* in Joshua Tree National Monument.

Leptospermum spp. New Zealand tea. Plants rich in Vitamin C, which Captain Cook used as an anti-scorbutic to ward off scurvy among his sailors.

After satisfying our appetites at one of the Zoo's snack-bar facilities, we proceeded to the nearby grounds of the Natural History Museum with its rich planting of native and exotic trees.

One of the first plants to engage our attention was a magnificent Moreton Bay fig, *Ficus macrophylla*, from Queensland, Australia. According to Dr. Moran's account of the "Trees Around the Museum" (a copy of which he had kindly sent me) this tree was planted in 1915 and in 1960 had a crown diameter of 93 feet.

Although our time in the grounds was limited, we spent a rewarding half hour in the monumental lath-house. Here against a luxuriant background of ferns, aroids and bromeliads, was a rich display of such genera as *Begonia, Columnea, Pelargonium* and many others. There were splendid specimens of the glory-lily (*Gloriosa superba*) and a stupendous plant of *Nopalxochia phyllanthoides* covered with a multitude of pink blossoms. It was a delight to see this relative of the night-blooming *Epiphyllum* in flower. The balance of the afternoon was spent in San Diego's widely advertised Sea World.

Fig. 11. Rock formations in Joshua Tree National Monument.

On the morning of Sunday, May 18, our desert tour began in earnest as we set off in a northeasterly direction with Palm Springs as our destination. For many miles we drove through the Cleveland National Forest where piñon pines and evergreen oaks were the dominant elements. Perceiving that the little town of Julian was not far off our route, we elected to stop there so that members of our tour could enjoy the wild flower display we had seen several days earlier. This proved to be well worth the time expended, for it gave everyone a valuable preview of many of the plants we were to see later.

After leaving Julian the character of the country changed dramatically and we found ourselves on the western fringe of the Mojave Desert. Now, in addition to the ocotillo, the jojoba, the yuccas and many of the cacti previously mentioned, we were able to point out numerous other plants characteristic of the desert. Conspicuous

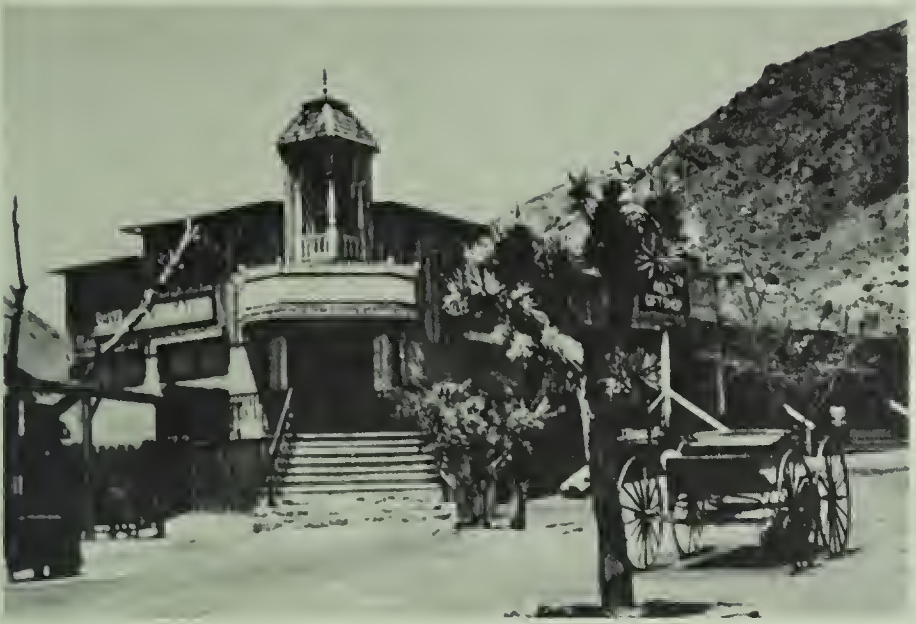

Fig. 12. The Nickleodeon at Calico.

among these were the creosote bush (*Larrea divaricata*) and the palo verde (*Cercidium floridum*).

The first of these is probably the most widely distributed species of our southwestern deserts. It is a low shrub in which the twigs and leaves are covered with an aromatic, resinous exudate, which probably serves to reduce transpiration. At certain localities it was in full flower, at others its yellow blossoms had been supplanted by fluffy white fruits. (Fig. 8).

Palo Verde means "green stick" and when it is not in flower or leaf the term is an appropriate one for this small tree. However, when covered with bright yellow flowers it is one of the handsomest plants of the desert (Fig. 9.)

One of the most important of all desert species is the mesquite (*Prosopis juliflora*), the sweetish pods of which are eaten by cattle. Another interesting plant is the Mormon tea (*Ephedra trifurca* or *E. nevadensis*), the source of a drink used by Indians and early inhabitants. These and many other xerophytes were to be our constant "companions" for several days to come.

A few words are here in order concerning John Tripp, our very genial and resourceful driver. John soon discovered that he had as passengers "a bunch of flower nuts", as he called us, and thereafter he did everything possible to add to our pleasure and enjoyment. Before reaching Palm Springs that afternoon he pulled into the Greyhound station at Indio to exchange our bus for what he hoped would be a better one. He came out to us with the information that the superviser there, Mr. Raymond Petitt, was also a "flower nut" who, when he heard that we were planning to visit Joshua Tree National Monument the following day, offered to accompany us.

This was indeed a rare stroke of good fortune for us. In the first place, it was largely because of Mr. Petitt's friendship with the head ranger that we were granted permission to drive our bus through the Monument, which is usually not allowed. Moreover, he took us to places and showed us plants we never would have seen otherwise.

Unlike some other species of *Yucca*, the Joshua tree (*Y. brevifolia*) is a tall plant with a branching habit. Indeed, it is because of the ascending posture of the upper limbs, suggesting a human supplicant, that the tree was given its common name.

The Joshua tree is regarded as a key plant of the Mojave desert, for their boundaries are essentially co-terminous. We had seen a few scattered specimens the day before, but nothing like the concentration which has led to this particular site being designated as a National Monument (Fig. 10). The species does not bloom every year, but because it had been a wet winter and spring we were so fortunate as to see a few well-developed inflorescences.

Even were it not for the interest generated by this unusual tree, the Monument would be worth traveling many miles to see, because of its weirdly tortured rock formations, not to mention a wide variety of other desert plants. Mr. Petitt led us to one after another spot where the sandstones and quartzites had been fashioned by the forces of erosion into unbelievable shapes and forms. (Fig. 11).

It was our self-appointed guide, also, who introduced us to the paper-bag bush (*Salazaria mexicana*), the desert mallow (*Sphaeralcea ambigua*) and a pretty little *Dudleya* which we took to be *D. lanceolata.*

As we left the park through its southern exit we crossed over the San Andreas Fault and stopped briefly to admire a plant in beautiful full pink flowering condition: the desert willow, not a willow at all, but *Chilopsis linearis*, a relative of the catalpa.

As we drove back to Palm Springs we passed through one of the many areas where date palms are cultivated on a grand scale. Upon parting from Mr. Petitt we tendered him a warm round of thanks for having made our day such a memorable one.

Our program for Tuesday called for a full-day drive from Palm Springs to Death Valley. Again it was driver John's suggestion that we might like to stop for luncheon at the ghost town of Calico. We readily agreed and as a result the noon hour found us wandering up and down the main street of what was originally a mining town, but which has been somewhat preserved and reconstructed as a tourist attraction. Here were the town hall, fire house, nickleodeon, court house, barber shop and all the other appurtenances of a boom town of a century ago. (Fig. 12). Equally fascinating to some of us were the contorted rock formations on a canyon wall across from the town. (Fig. 13).

Upon leaving Calico we drove first northeast through the Soda Mountains to Baker, then slightly to the north-

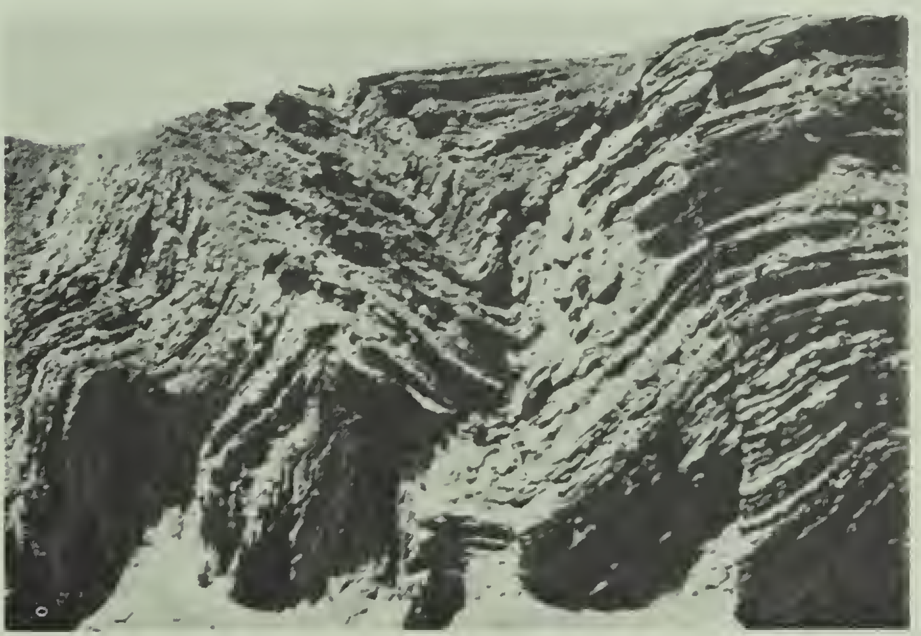

Fig. 13. Contorted rock formations at Calico.

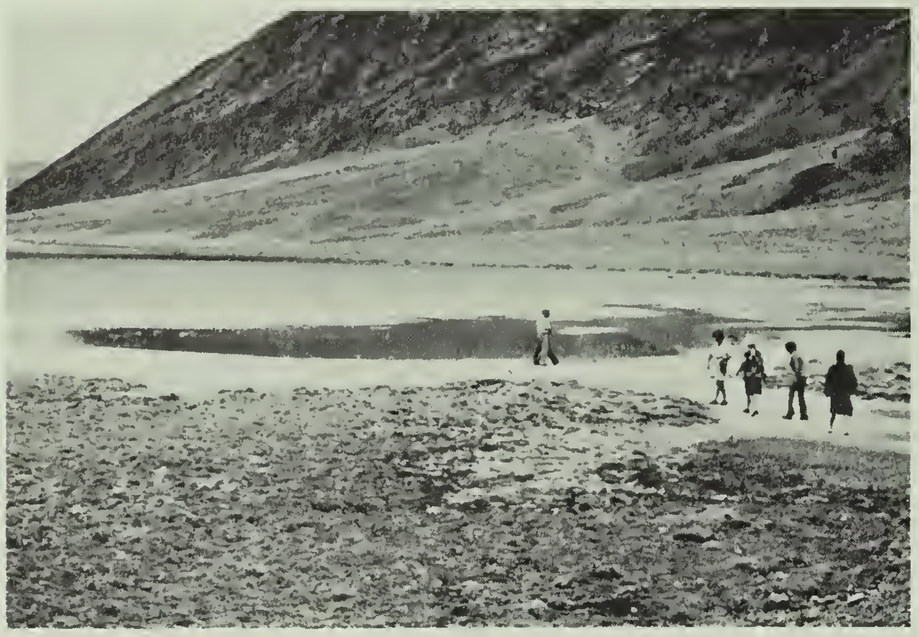

Fig. 14. Badwater in Death Valley.

west,checking in late that afternoon at the Furnace Creek Ranch in Death Valley.

Much has been written about Death Valley, its geology and mineral resources, its Indian tribes, its early prospectors and its plants and animals. But nothing which we had read prepared us for the sights which greeted our eyes as we drove around the valley the following morning.

Bourke Lee in his "Death Valley. An Immortal Desert", has given the following dramatic account which provided a background for much that we saw. Speaking of the genesis of the Great Basin, of which Death Valley is the southernmost extremity, he writes, "In past ages water wore down many mountain masses in the Great Basin. Then other powers remolded the land that water had worn away. The land was picked up and thrown high into the air. Its rocks were melted and twisted into new ranges. The new ranges were tied into knots to create new mountains. Volcanoes domed the mountains. Earthquakes tumbled the uplifted land masses about. Great faults and slips sliced through the mountain structures and unsupported sections of the ranges fell into place. The reconstructed land was sprayed with colors — the gem colors of rock that is alive and changes its hue with the light. — Death Valley, in the southern portion of the Great Basin, rests in the deepest setting."

We drove that Tuesday morning to Badwater, the deepest spot in that "deepest setting". Here, at 282 feet below sea level, we were not only at the lowest spot in Death Valley, but reputedly also in the western hemisphere. High above us on a rocky cliff-face was a sign which read "Sea level". It gave us all a queer feeling. (Fig. 14).

There was a bit of a seepage at Badwater, but it must have been a highly salty character, for the only plant in evidence was a fringe of pickle-weed (*Allenrolfea occidentalis*), a fleshy member of the goosefoot family (strongly resembling *Salicornia*) which it is said can endure more alkali than any other species known to botanists.

From Badwater one looks out across what appears to be a vast lake, but is in reality a bed of salt many feet in thickness. From near here, also, one may gaze upward toward Telescope Peak more than 11,000 feet high, snow-capped throughout most of the year. Parenthetically it may be noted that summer temperatures in Death Valley have been recorded at more than 130° F. The day we were there it was a pleasant 85°.

Although it was not possible to take our bus up the road to Dante's View, we did get to Zabriskie Point, which provided not only a spectacular panorama across the Valley, but an opportunity to appreciate some of its contorted and colorful geological formations. (Fig. 15).

Contrary to popular belief, Death Valley is by no means completely devoid of vegetation. In fact more than a hundred and thirty species of higher plants have been recorded from within its boundaries. As might be expected, most of these are either shrubs or annuals, the types of plants which can best adapt themselves to conditions of extreme heat, intensive light and prolonged drought.

One of the genera best represented in the Valley is *Atriplex*, a member of the goosefoot family (which we in the east know as orach or sea-blight, a common plant on our sea beaches and brackish meadows). There are five species of *Atriplex* in Death Valley, of which *A. hymenelytra*, known as desert holly, is perhaps the most beautiful, with its almost ghostly, translucent purple-gray foliage. Among other truly desert plants which we observed in the Valley were the bur-sage (*Franseria dumosa*), the burrobush (*Hymenoclea Salsola*), the winter-fat (*Eurotia lanata*) and an intriguing little prostrate composite known as turtle-bush (*Psathyrotes ramosissima*). Sometimes it seems that the smaller the plant the longer is its botanical name.

It was with considerable reluctance and an overwhelming desire to return that we departed from Death Valley after lunch and drove across the Amargosa Desert to Las Vegas, Nevada, where we had reservations at the sumptuous Sands Hotel.

It was on this drive that we first saw *Yucca schidigera* in flower, as well as several other species of *Opuntia:* (*O. acanthophora*, *O. Bigelovii* (Fig. 16) and *O. ursina*).

Since the program for May 22 included visits to Boulder City, Hoover Dam and Lake Mead, it seemed to promise little of botanical interest. Nevertheless, there were compensations, even a few of them concerned with plants. We made a couple of stops on the way to Boulder City, but none yielded other than the same species we had already seen. At the visitors' center at Lake Mead, however, there

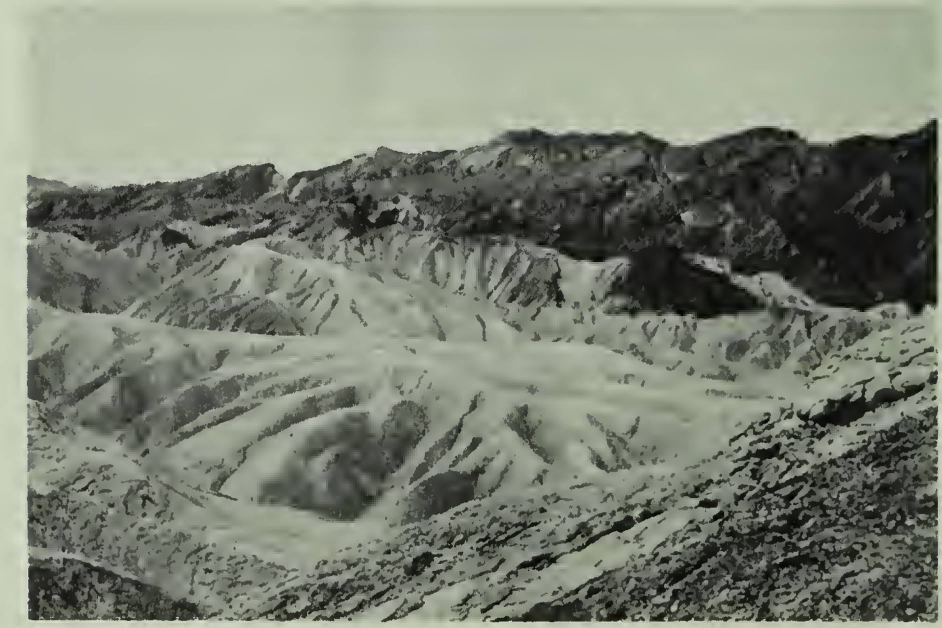

Fig. 15. Eroded sandstones at Zabriskie Point.

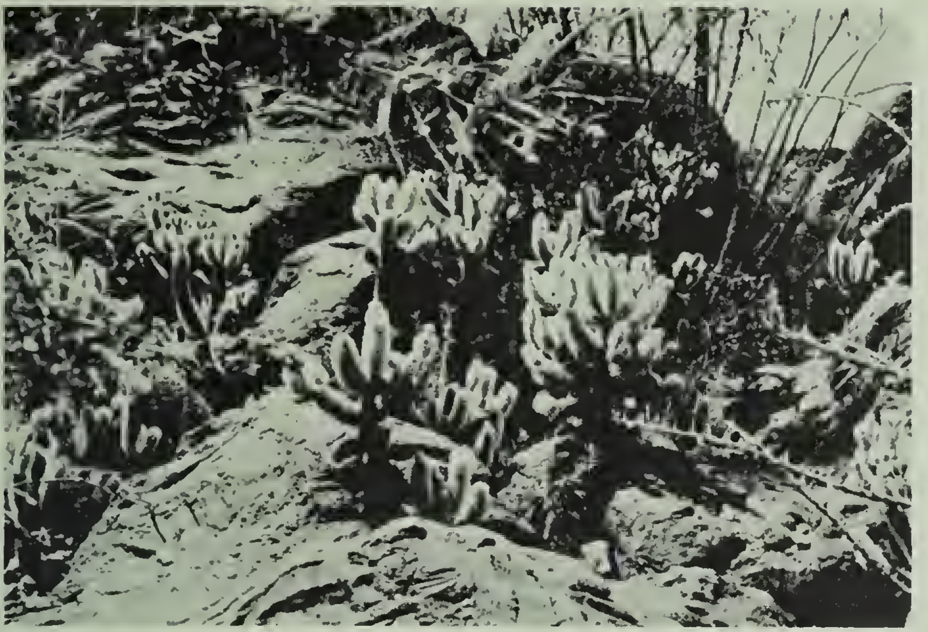

Fig. 16. *Opuntia Bigelovii.*

was a fine living collection of local cacti, especially *Opuntia*. Here were the Teddy-bear (*O. Bigelovii*), the grizzly-bear (*O. ursina*), the buck-horn (*O. acanthophora*) and the darning-needle (*O. ramosissima*).

We took the standard tour of Hoover Dam and marveled, as millions of others have done, at man's engineering genius in creating one of the wonders of the modern world. Descending by elevator down the Nevada side, we surfaced in Arizona, then walked back across the dam-breast to Nevada and our waiting bus.

Following lunch at a nearby marina, we set off on a guided tour of the rocky desert area west of Lake Mead. Our ''guide'' on this occasion was an electronic tape which we had ''borrowed'' from the visitors' center at Lake Mead. We fed it into the microphone of our bus and from it were able to follow every numbered turn of the winding road and to learn a great deal about the background, the geology and the natural history of the region we were traversing. This device has much to commend it.

Toward the end of the afternoon we drove westward across the Valley of Fire and were treated to some of the most spectacular views of rock conformation and color we had seen, and by this time we had seen quite a few. (Fig. 17).

Friday, May 23, found us on the road between Las Vegas and Phoenix, Arizona. By mid-morning we left the Mojave Desert behind us and entered the Sonoran Desert which occupies most of southwestern Arizona and extends southward into the state of Sonora, Mexico.

Whereas the Joshua tree is an indicator plant of the Mojave Desert, the key species of the Sonoran is the saguaro (*Carnegiea gigantea).* We began seeing scattered specimens of this giant cactus as we approached Phoenix, yet in nothing like the abundance we were to encounter farther south.

Although Phoenix lies in the middle of a desert, the surrounding area has been extensively irrigated and supports many fine-looking farms. This we had noted in flying westward toward San Diego some days earlier.

The following morning we paid a visit to the Desert Botanical Garden of Arizona on the outskirts of Phoenix. Although Dr. W. Hubert Earle, the Director, was unable to be present, he had written extending us a warm welcome and the members of his staff received us most cordially.

This garden is picturesquely situated, with mountains in the background and a collection of mature desert plants which is truly magnificent. (Fig. 18).

Armed with copies of a self-conducted tour booklet, we were able to walk through the garden, pausing before each numbered section to read what the guide had to say about the plants it contained.

As might be expected, the collection was especially rich in species of *Opuntia* and we saw here several which were new to us, e.g., *O. linguiformis, O. fulgida, O. microdasys* and a pinkish form of *O. basilaris* which has been named 'Santa Rita'.

There was an amazing specimen of *Stetsonia coryne*, a tall branched cactus resembling a *Carnegiea*, but of a much darker green. One of the most entertaining features of the collection was a row of saguaros showing them at different ages between ten and fifty years (Fig. 19). This species grows very slowly and many of the large ones we saw later were several centuries old.

The genus *Dasylirion* was here represented by *D. Wheeleri*, the sotol or spoonplant. The common name derives from the fact that the overlapping leaves which are inflated at the base are often sold as ''desert spoons''.

The garden contains an enormous lath house in which may be seen, among other things, many succulents from South Africa and other arid regions. The two hours spent in this garden passed all too quickly and we left it with a deep feeling of admiration.

That afternoon we drove south to Tucson through desert country frequently punctuated by saguaros, with the usual accompaniment of yuccas and cholla cacti.

On Sunday, May 25, we traveled some 60 miles to Sonoita where we were met by Mrs. Robert Ballantine. Jinny Ballantine had been a student at Barnes when she lived in Philadelphia, but Bob and she now have a beautiful home a few miles south of Sonoita. They are located in the Upper Sonoran at an elevation of about 4000 feet and the surrounding vegetation consists largely of oaks. It is difficult to escape the desert, however, and in among the trees were bear-grass (*Nolina*) cliff-rose (*Cowania*, a shrubby member of the Rosaceae) and ratany (*Krameria*, of the Leguminosae).

I had distributed to members of the tour mimeographed

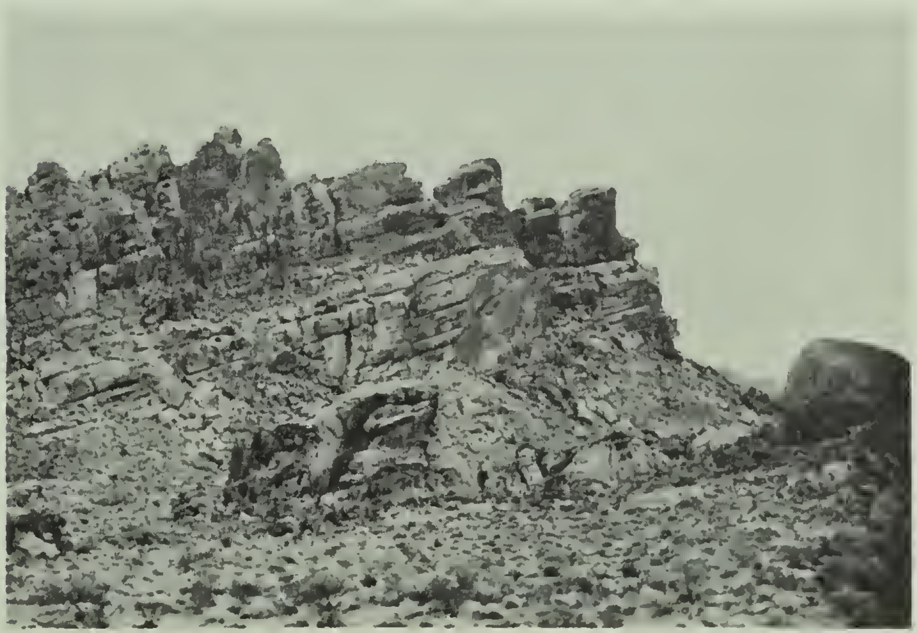

Fig. 17. View in the Valley of Fire. Photo by Dr. Charles Korbonits.

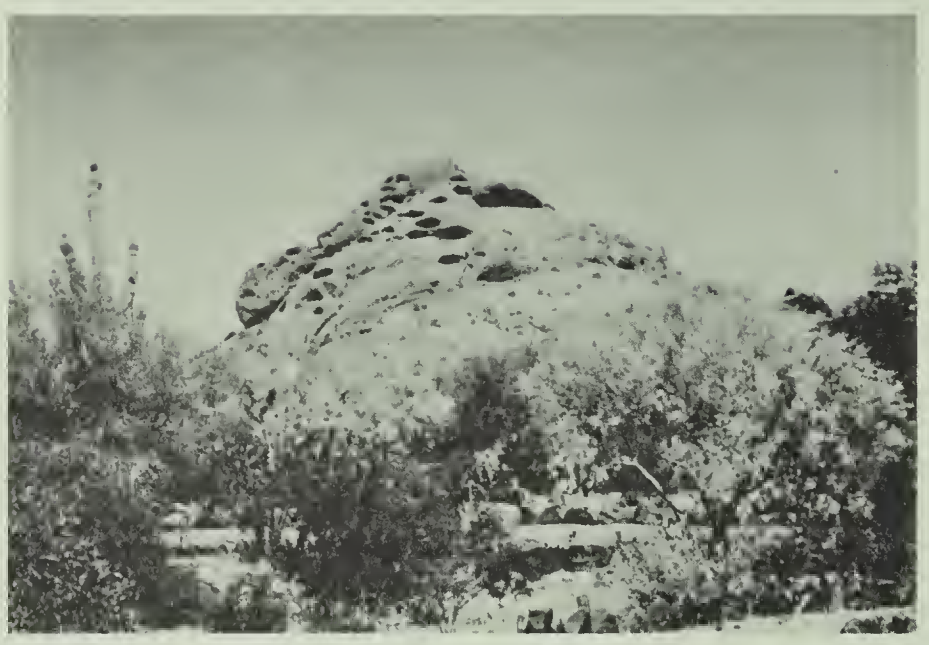

Fig. 18. View from the Desert Botanical Garden in Phoenix. Barnes Butte in background.

lists of some of the characteristic desert plants we were likely to see, but so far we had not yet come upon the beautiful mariposas or butterfly lilies (*Calochortus*). It was therefore exciting to find them in the Ballantines' "back yard".

Our main purpose in coming to Sonoita was to visit the Research Ranch, a few miles distant. This is a property of some 8000 acres on which there has been established a long-term project designed to collect ecological data and study all aspects of the environment. We had taken box lunches with us and after consuming them in a delightful picnic grove we were favored by having Dr. Larry Michel, the director, explain the objectives of the undertaking and answer questions.

It had been our original plan to drive to Las Cruces, New Mexico, to have a look at the Chihuahua Desert and White Sands Monument. Since, however, this would have necessitated a return to Tucson in order to retain an advantageous air-travel rate, it was decided to remain in Tucson until the date of our departure for home. In retrospect this proved to be rather fortunate, for not only did it avoid two full days of arduous driving, but it enabled us to see much more in the Tucson area than would otherwise have been possible.

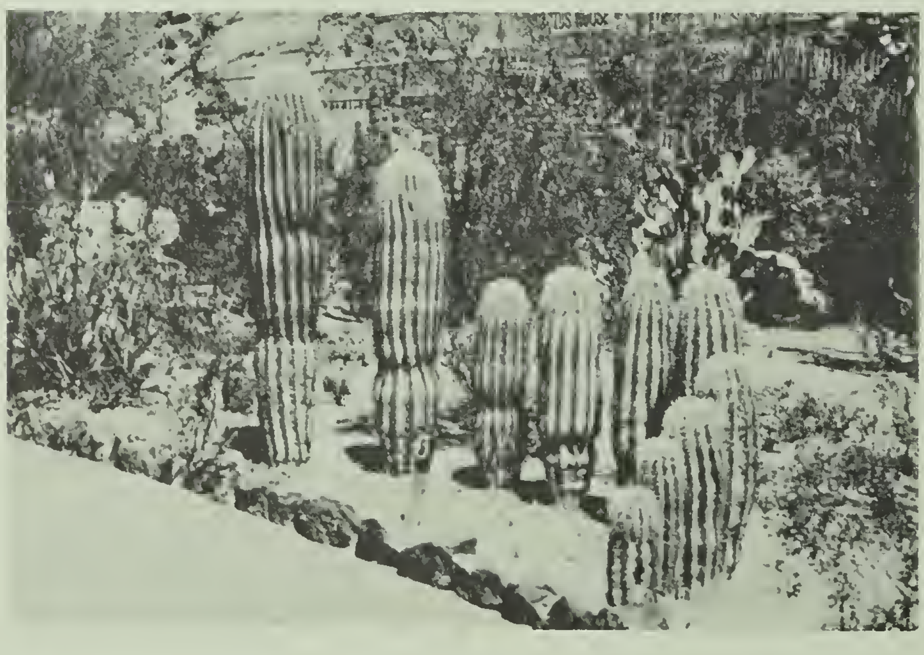

Fig. 19. *Carnegiea gigantea* in the Desert Botanical Garden, from 50 years old (left) to 10 years (right).

On Monday afternoon we visited Saguaro National Monument. As was the case with the other monuments we had seen, there was here an attractive visitors' center with an auditorium in which slide lectures or movies are presented, a museum, a book store and an outdoor collection of local desert plants, all beautifully labeled.

When I first visited this area many years ago there were no well-marked roads. Today there is a nine-mile scenic drive with numbered stops and frequent turn-outs. It was extremely exciting to be able to wander around in this great cactus forest, but tantalizing when it came to deciding which one or ones to photograph. (Figs. 20 and 21). At one point we descended from the bus and followed a winding trail along which many of the smaller native plants were labeled.

The palo verde here was in full flower, creating a golden mist across the desert. Since it is the state tree of Arizona and the blossom of the saguaro is the state flower, it was fitting that the two should be closely associated here.

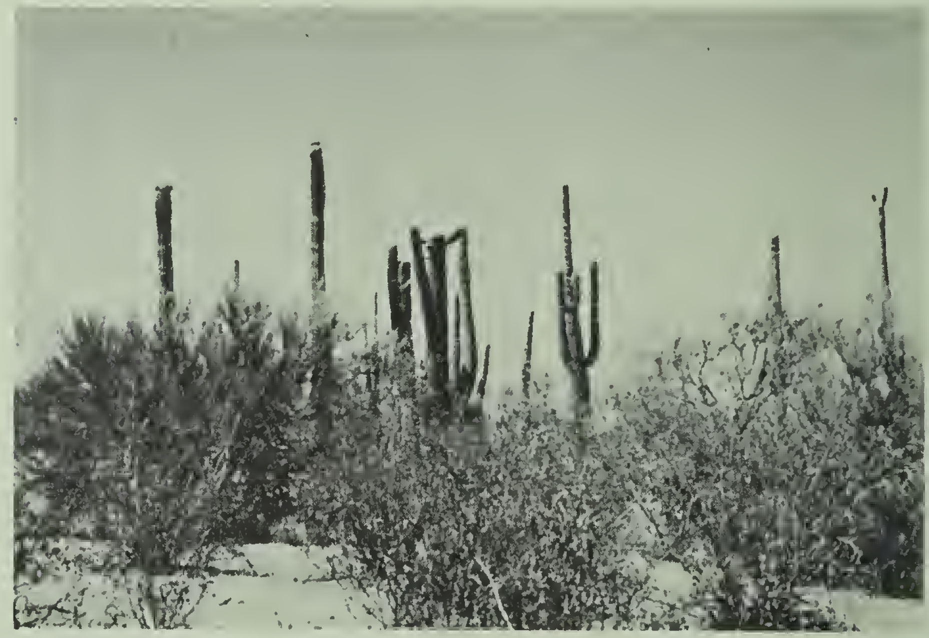

Fig. 20. *Carnegiea gigantea* in Saguaro National Monument.

We spent the following day at the Boyce Thompson Southwest Arboretum at Superior, some 70 miles north of Tucson. Mrs. Ballantine, who accompanied us, had telephoned ahead and we were welcomed by Dr. Frank Crosswhite, Curator of Botany, who told us something of the history and objectives of the arboretum and conducted us on a mile-long trail which encircles the grounds.

One of the interesting features seen along this trail was an exhibit of ancient rocks, of which a pile of pre-Cambrian schist was the oldest. There were also a rock garden and a cactus garden, the latter containing several species of *Opuntia* we had not seen before such as *O. spinosior, O. rufida* and *O. versicolor*. (Fig. 22). What intrigued us most was a pair of boojum trees. Botanically this is *Idria columnaris*, a species indigenous to Lower California which belongs, along with *Fouquieria*, to the Fouquieriaceae. It is remarkable in having a tall fleshy conical or cylindrical trunk from which issue numerous spiny branches. We had seen this curious plant once or twice before, but never as well developed as it was here. (Fig. 23).

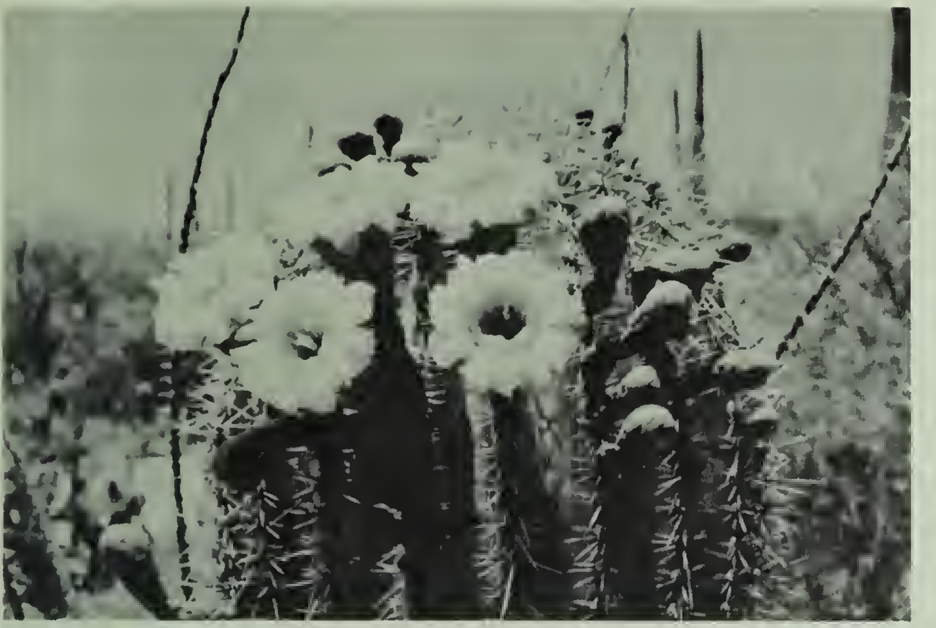

Fig. 21. Flowers of *Carnegiea gigantea.*

Dr. Crosswhite and his wife, who is a zoologist, had kindly invited my wife and me to have lunch with them in their commodious home on the grounds and we greatly enjoyed not only being with them but seeing the astonishing number of desert plants which they had under cultivation.

The arboretum is engaged in serious research and we were shown the quarters in which graduate students here reside who come from the University of Arizona to pursue their investigations.

Before departing we investigated the reception center to which are attached two fine greenhouses, one devoted to cacti, the second to other succulent plants.

On Wednesday, May 28 (our last full day) we drove to the Arizona-Sonora Desert Museum 14 miles west of Tucson, where we were warmly received by Dr. Don P. Ducote, Curator of Botany. This museum is a combination of zoo, aquarium, botanical garden and natural history exhibit, the chief purpose of which is to relate the ecological story of the Sonoran Desert region. It contains over 300 species of plants and more than 200 kinds of animals.

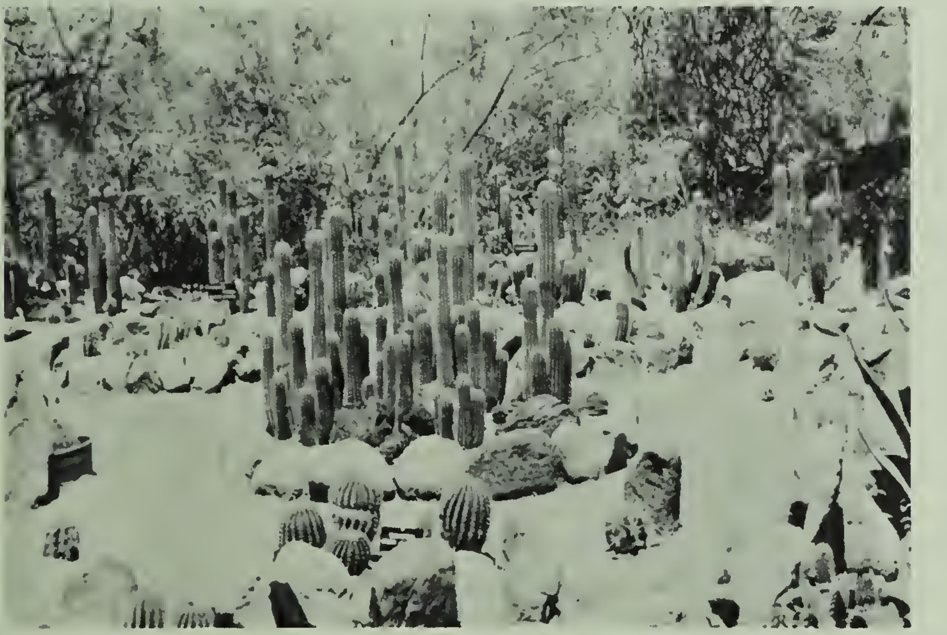

Fig. 22. Cactus garden in the Boyce Thompson Southwest Arboretum.

Since most desert animals are nocturnal there is a long tunnel from which the visitor may gaze into their subterranean dwellings. There is a walk-in bird house and a number of exhibits demonstrating the action of water in desert habitats. Everything is beautifully displayed and tastefully labeled.

By this time we had become rather familiar with many of the desert plants, but there were some novelties, here including *Dioon edule*, a fascinating tropical cycad, and *Lemaireocereus Thurberi*, an elegant tall columnar cactus native to the area.

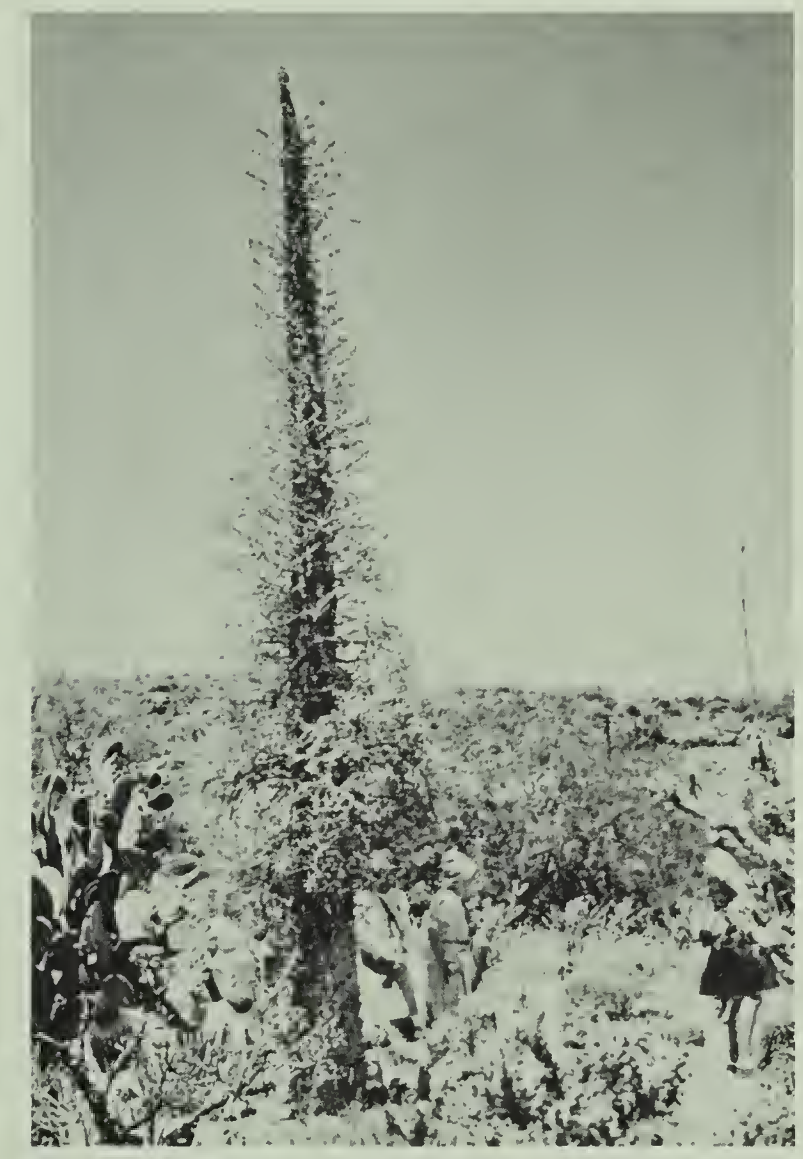

Fig. 23. *Idria columnaris.*

For many of us the prize exhibit of the garden was a saguaro with an enormous crest. We had seen these strange disfigurations (the cause of which is unknown) once or twice before, but this one surpassed all of them.

Upon leaving the museum we made a brief stop at the San Xavier mission, believed to be the finest example of Spanish architecture in the southwest. That evening some of us went to Nogales in Old Mexico for dinner and the following day we left for home.

THE MANCHINEEL — — TOXIC, YES, BUT OVERDRAMATIZED

JULIA F. MORTON, Coral Gables, Florida

I feel compelled to comment on the reference to the manchineel on page 4 (Number 14) of the March *Newsletter*. The toxicity of this tree has been greatly exaggerated, partly through repetition and re-repetition of passages from the accounts of the early Spaniards in tropical America. They reportedly suffered illness and fatalities from consuming the fruits, but the flesh is so scant that, after the first bite, there is no possibility of mistaking them for crabapples as they are said to have done. They are also reported to have been poisoned by eating the land crabs that fed on the fallen fruits and fish that supposedly did the same, but it is quite likely that ill effects from fish-eating were actually cases of ciguatera. Goats eat the fallen fruits but there have been no claims of illness from eating the flesh of these animals. Sensationalists ignore Oviedo's report of a man who ate 5 or 6 fruits without injury. Some people have eaten as many as 24 with no ill effect. Others are affected, but not fatally. Verdcourt and Trump, in *Common Poisonous Plants of East Africa* (1969) speak of a manchineel tree in the Botanical Garden in Dar-es-Salaam and remark that "there have been several cases of mild poisoning of persons who have eaten the fruits; the symptoms are severe diarrhoea and stomach pains accompanied by a sore tongue and mouth which only clears up after about three weeks." In experiments at the University of Florida, fresh fruits were ground and fed to several groups of rats and rabbits and produced no symptoms of poisoning even after doses of 25 gm. per kg. of body weight, whereas extracts of wood and leaves, injected into rabbits, rats, mice and guinea pigs caused poisoning and some fatalities.

The sap, indeed, does cause rash, inflammation, vesication and swelling in some individuals. However, Dr. Walter M. Buswell wrote: "...I have climbed up in the trees to cut off the fruit, the sap running all over my hands, with no ill effects."

I have spent much time over the past 10 years in close association with the manchineel on the island of Curaçao. It is much appreciated on that island and elsewhere in the West Indies as a coastal shade tree. I have photographed tourists lying in beach chairs beneath its widespread branches on the grounds of luxury hotels, and have habitually parked my rented Volkswagen in its shade and have collected plants in and around manchineel thickets. The Caribbean Marine Biological Institute is nestled in a grove of manchineel trees overhanging the whole installation. People in Curaçao hardly ever suffer from the sap unless workmen are cutting down a tree to widen a road, or accidentally make some other direct contact with the latex or crushed leaves. One Dutch Marine experienced acute keratoconjunctivitis from a bit of the sap in his eye, but identical cases often occur in Florida from the sap of the commonly cultivated ornamental plants, *Euphorbia tirucalli* and *Euphorbia lactea*.

Several times in Florida people have come to me with accounts of severe dermatitis from contact with the manchineel but, on checking the facts, I have found the offending tree to be the poisonwood, *Metopium toxiferum*, which is exceedingly common and toxic but has never been sensationalized. Many people have been misled by published statements based on hearsay or assumption such as the following from the book, *Native Trees of Florida* by West and Arnold (revised 1956): "Manchineel trees are rather uncommon now, although formerly quite abundant. They have been carefully destroyed in the vicinity of all habitations, because they are the most poisonous trees in North America."

Dr. John Popenoe, Directer of the Fairchild Tropical Garden, shares my belief that there never has been any need for nor any systematic destruction of manchineel trees in Florida. The much-maligned tree did not interfere with the settlement of this area. It occurs wild, as it always has, in Everglades hammocks in the Cape Sable Region and on the Lower Keys and occasionally on the Upper Keys. It is not mentioned at all by Harshberger in his detailed analysis of the *Vegetation of South Florida* (1914), though he frequently encountered poisonwood and poison ivy.

In the West Indies, in the old days, the manchineel was cut for its fine wood, resembling Circassian Walnut. It was necessary to build a fire at the base of the tree to char it and eliminate the sap before chopping it down. When well cured, the wood was fashioned into furniture.

SOME INTERESTING SPECIFIC NAMES

The meanings of many words have undergone significant changes over the centuries. When Hamlet declared, "I'll make a ghost of him that lets me," he was employing the verb "let" in the Elizabethan sense of "prevent" rather than "permit", as we understand it today.

While not many words have been so diametrically altered, there are numerous instances in which the original meaning has been distorted and often forgotten. Nowhere is this better illustrated than in the case of certain Latin adjectives which have been applied as specific epithets in plant taxonomy.

It is the purpose of this article to examine a few of these and to call attention to their original meaning as well as their present interpretation. In all cases the adjective will be stated in its masculine form, but modified to agree with the gender of the genus in the examples cited.

Barbarus. This strange word has had many meanings, mostly signifying a foreigner, e.g., a non-Hellene, a non-Roman, a non-Christian, a non-Italian, a rude, wild uncultured person or a native of Barbary, all of them barbarians. An attractive climbing member of the Saxifragaceae, native to the rich woods and swamps of our Southeastern states bears the name *Decumaria barbara* because it was originally supposed to have come from the Barbary coast of North Africa.

Blandus. Today the term "bland" connotes suave, soothing or mild (as in a bland diet). Formerly, however, it was defined as agreeable or pleasant and this interpretation may have been in William Aiton's mind when he gave the name *Rosa blanda* to a beautiful wild rose which occurs from the Gulf of St. Lawrence south to Pennsylvania, Ohio and Illinois. On the other hand, he may have been impelled by the fact that, unlike most roses, this species is practically devoid of prickles.

Candidus. Today a candid person is one who is honest or straightforward; candid writing is clear or lucid. But the original meaning was white and in this sense the name is applied to such combinations as *Salix candida*, a willow with pure white under leaf surfaces. *Berberbis candidula* also has leaves which are white beneath. Another form of the adjective is *candicans*, as in *Galtonia candicans* and *Trichocereus candicans.*

Formosus. This Latin adjective means beautiful or charming and it was because of the beauty of its flowers that the island of Formosa or Taiwan was so named. When appended to a plant genus this sense is preserved, e.g., *Leycesteria formosa.* However, when a plant is native to Formosa the adjective assumes a different form, e.g., *Liquidambar formosana.*

Lividus. The term "livid with rage" may well mean different things to different people, but there can be no doubt that its original meaning was of a bluish leaden or a grayish-blue or lead color, which seems to have inspired the name *Carex livida* for a widespread species of Eastern North American sedge and various other species to which this epithet has been attached.

Lucidus. Originally defined as "bright, shining or resplendent," this adjective has undergone a gradual and logical metamorphosis, so that today its mere mention suggests a "lucid statement or argument." Fortunately, such combinations as *Salix lucida* (the shining willow) and *Cotoneaster lucida* serve to remind us of a meaning which might otherwise be completely obscured.

Luridus. One of the commonest species of sedges in Eastern North America is *Carex lurida.* In Gray's Manual (Ed. 8) the specific name is translated as "sallow" and the Oxford Dictionary by defining sallow as a "sickly yellow or brownish yellow color, brings us back to the Latin definition of lurid as "wan or pale yellow." If one recalls that in this country a certain type of journalism has been characterized as both "yellow" and "lurid", then it is easy to comprehend how such a word may have acquired not one but several new meanings. Fortunately, in other binomials, such as *Agave lurida*, its original context has been perpetuated.

Politus. Closely related to the Greek politikos or citizen, this word in Latin came to mean polished. After all, by extrapolation, was not the inhabitant of a city refined, cultivated and urbane? In botany its original connotation of smoothed or burnished has been preserved; *Picea polita*, the tiger-tail spruce, derives its name from the fact that the persistent bud-scales form blackish, polished sheaths along the branchlets. To those whose epidermis has been pricked by its needle-like leaf-tips it may seem that its specific name might better be *impolita.*

Pungens. From the Latin *pungere* to prick or to puncture. Today this conveys the impression of a penetrating taste or smell, but as applied to a plant it correctly implies the presence of a sharp point, e.g., *Picea pungens, Pinus pungens, Elaeagnus pungens.*

Rivalis. Originally the term "rival" pertained to one living near or using the same stream (from Latin *rivus*, a brook) as another. Later it acquired the meaning of a competitor, that is, a person who aspires to equal or surpass another from the opposite side of the same stream. In such a combination as *Geum rivale* (literally, of brook-sides) its earlier connotation has been retained.

Sordidus. Most English-language dictionaries define sordid as "dirty, filthy, squalid" or even "vile". In botany it is generally accepted as meaning of an impure white, as the pappus of certain plants, or as in *Salix sordida* in reference to its yellowish pubescence.

Speciosus. Although the term "specious" basically implies "beautiful" or "showy, it has somehow acquired a pejorative meaning: plausible but not genuine. A specious argument is equivalent to a false argument. As applied to plants, however, the original meaning of the word is retained, e.g., *Chaenomeles speciosa*, *Faucaria speciosa.* It is even used in the superlative form, e.g., *Telopea speciosissima*, the waratah of Australia.

J. M. F., Jr.

NOTES FROM THE ARBORETUM

A FERN DELL

Mrs. Albert C. Barnes, founder of the Arboretum of the Barnes Foundation, was keenly interested in hardy ferns and during the 1930's planted many species in the wooded area which forms the southwestern boundary of the Arboretum.

In April, 1939, Mrs. Barnes gave a lecture on "The Cultivation of Hardy Ferns" at the Morris Arboretum and an abstract of this talk appeared in the Arboretum Bulletin for July of that year (Vol 2, No. 16).

The exact number of species in the original planting is unnown but is believed to have been between ninety and a hundred. Although some of these have failed to survive, the collection is still not only a representative one, but contains a few truly choice items, e.g., roseate wood-fern (*Dryopteris erythrosorus*) and green wood-fern (*Arachnioides Standishii*).

Believing that this collection should be more widely seen and appreciated, the decision was made this spring to create a trail following existing paths and leading the visitor past many of the more interesting plants. Fortunately, Dr. Edgar T. Wherry, a keen student of ferns and for many years a member of the faculty of the Arboretum School, assumed the leadership in this project, checking all identifications and laying out the walks. New labels, giving both common and scientific names, were made and arrows were so placed as to enable the visitor to follow a designated course. It is hoped that the "Laura L. Barnes Fern Dell" will prove to be a useful teaching adjunct as well as a feature of interest to others who visit the Arboretum.

ROCK GARDEN VISIT

On Saturday, July 12, some forty members of the Delaware Valley Chapter of the American Rock Garden Society visited the Arboretum's newly established rock garden, as well as its heath and heather gardens and the Edgar T. Wherry Memorial Garden.

The existence of this rock garden is due largely to the devoted efforts of Mr. and Mrs. John S. Kistler. It was John (at one time a member of the faculty of the Arboretum School) who designed the lay-out, obtained the rocks from a nearby quarry and supervised their placement in such a manner as to simulate a natural outcrop. And it is Anita Kistler who is responsible for most of the plants. Other contributors have been Mr. Morris Berd, Mr. William S. Patten and Mrs. John C. Wister.

Work on the garden was begun on November 19, 1972, and "planting day" was May 6, 1973. The garden is approximately 60 feet long with an average width of 15 feet. Mr. Kistler has, by the use of transverse paths, divided it into three sections — one for American species, one for European plants and the third for Asiatic representatives. The collection therefore possesses an educational as well as an aesthetic appeal. To date it contains over 230 different species and varieties and is still growing. A future issue of this *Newsletter* will contain a more detailed account of its contents.

THE STAFF

Dr. Gordon has assumed the task of preparing "A Centennial History of Ecology" to be used in a forthcoming book devoted to the history of biology. In June he and Mrs. Gordon visited the Garden in the Woods at Framingham, Massachusetts, and attended a bicentennial celebration held in that town. In July they participated in a tour of the Pacific Northwest which included Banff, Lake Louise, Victoria and Vancouver.

Mrs. Hopkins held four azalea culture and propagation workshops for Barnes students during July and designed a James River plantation in Virginia.

Mary and Joe Langran spent two weeks in Italy during May, up-dating his slides of ancient Roman and Renaissance gardens. These included the Villas of Emperor Hadrian and Tiberius (the former is at last being restored). Villa d'Este was photographed during the day and also at night with the new lighting. Villa Callazzi, designed by Michelangelo, and Villa La Pietra, both at Fiesole, were visited as were the Boboli Gardens in Florence and Pompei which continues to be excavated.

Dr. Penny has been doing some field and laboratory studies on the problem of the geologic age of the Bryn Mawr gravels using fossil spores and pollen as indicators.

On June 6 Dr. Fogg was given the first Morris Arboretum Award in recognition of his years of service to that institution. Planted in his honor was a tree of *Magnolia brooklynensis* 'Evamaria'. At the Garden Center of Greater Cleveland on June 17 he gave an illustrated lecture entitled, "A Botanist in the South Pacific".